June 21, 1960 J. E. MONROE ET AL 2,941,236

HINGE

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Fig. 1.

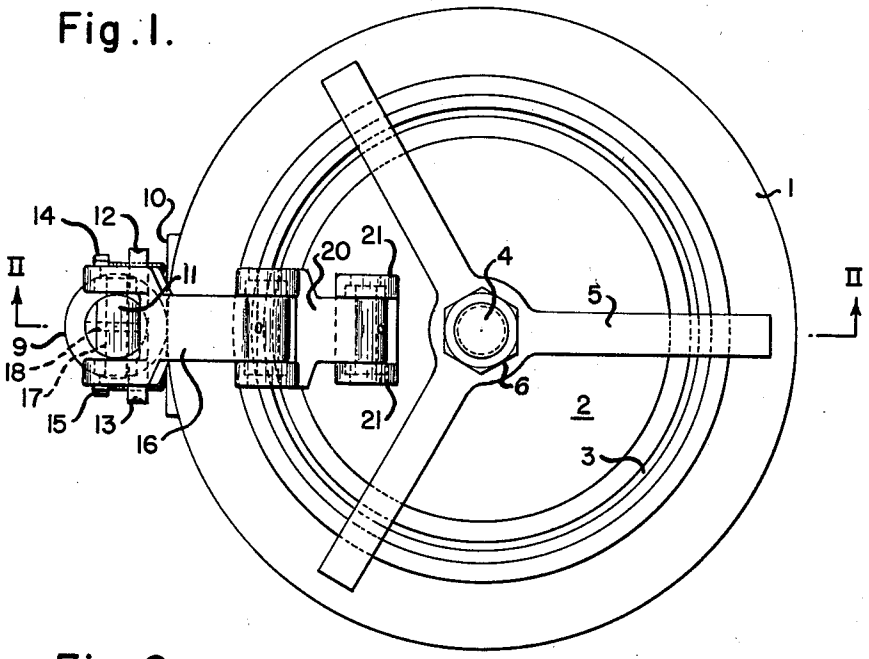


Fig. 2.

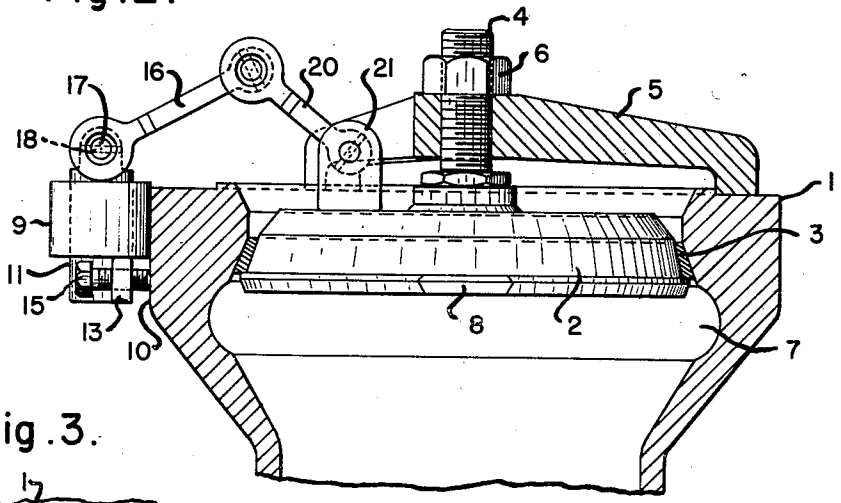
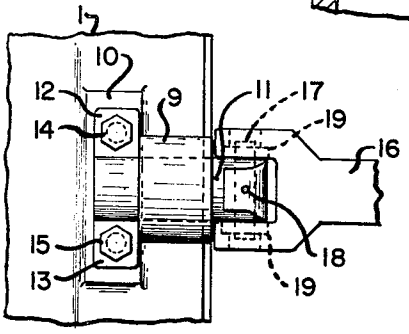


Fig. 3.



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2,941,236

HINGE

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9 Claims. (Cl. 16—163)

This invention relates to hinges which are adjustable for positioning of the supported member.

In the construction of equipment such as boilers, heat exchangers, autoclaves, filters, fractionating towers, pipeline traps and many types of pressure vessels and piping systems, it is frequently necessary to provide access to the interior through some type of opening or manhole. Nevertheless, the opening must be capable of being sealed by some type of closure for normal operation. It is generally desired that the closure cover as much of the opening as possible so that any gasket required will be of small size and unlikely to blow out under pressure. Consequently, the fitting of closures to openings of this type is customarily made with very little clearance. In some instances external closure members such as blind flanges or caps are employed, and in other instances some type of internal closure member is employed. The closure members are frequently quite heavy sometimes with weights of the order of several thousands of pounds. Heretofore, because of close fitting required, it has been necessary to employ mechanical devices having very critical alignment or to employ a large number of men or auxiliary hoisting equipment to remove and replace such closures. Hinges which have heretofore been used have required critical adjustment so that the closure will be properly aligned with the opening when the hinge is installed. Field installation of such hinges has been difficult to make since any misalignment of the hinge or its mounting will result in misalignment of the closure. Further, if the hinge is properly aligned in the first instance, wear of the hinge components may cause the closure to become misaligned after installation. We have invented a new and useful hinge for supporting a member which is capable of wide and critical adjustment when the hinge is installed and which may be compensated for any wear occurring during use.

We provide a mounting and at least one hinge member pivotally connecting the supported member to the mounting. We preferably provide a hinge support member which is pivotally attached to the mounting. We further preferably connect the supported member with the hinge support member by a plurality of pivotally connected hinge members.

Other objects, details and advantages of our invention will become more apparent from the following detailed description of a preferred embodiment thereof.

In the accompanying drawings we have illustrated a present preferred embodiment of our invention in which

Figure 1 is an end elevation of a vessel and closure member supported therefrom by a hinge embodying our invention;

Figure 2 is a view taken along section II—II of Figure 1 with some parts in section; and

Figure 3 is a partial side elevation of the vessel in Figure 1.

A vessel 1, which may be a blank end in a pipeline or a manhole in a pressure vessel, has an opening which is closed by closure member 2. The vessel and the

closure member are sealed by a gasket 3 placed between the other two components. The closure member is held tightly against the gasket by stud 4, by spider 5, which spans the opening in the vessel, and by nut 6. Pressure in the vessel further serves to seal the gasket. To gain access to the vessel, nut 6 and spider 5 are removed and the closure member is positioned in enlargement 7. Gasket 3 may then be removed from closure member 2, collapsed to an elliptical shape, and withdrawn through the opening. Closure member 2 may then be rotated within the vessel and withdrawn so that flat surface 8 and a like surface on the opposite side of closure member 2 are at the point of greatest width of the closure member as it passes through the opening. In this manner it will just clear the opening. We have shown for purposes of illustration a closure member such as that illustrated in United States Patents Nos. 2,582,995 and 2,582,997.

Mounting 9 is attached to the side of vessel 1, preferably by welding, and a flat surface 10 is formed or built up on vessel 1 adjacent to mounting 9. Hinge support member 11 is pivotally mounted in mounting 9 and terminates in two lugs 12 and 13. Cap screws 14 and 15 are threaded in lugs 12 and 13 respectively and engage bearing surface 10. Hinge member 16 is pivotally connected to hinge support member 11. The end of hinge support member 11 is drilled to accommodate hinge pin 17 which is held in position by locking pin 18 driven through support member 11 and hinge pin 17. Hinge member 16 is mounted on bearings 19 which are journaled on hinge pin 17. In like manner hinge member 20 is pivotally connected at one end to hinge member 16 and at the other end to lugs 21 attached to closure member 2. Preferably, roller bearings are employed for heavier closure members to make pivotal motion of the hinge sections easier and to reduce wear at the pivot points.

To install the hinge, mounting 9 may be attached to vessel 1 as a part of field installation. The bearings and hinge pins are assembled with the hinge components whereupon the small locking pins are driven into place and their ends peened over. The closure member with the gasket is attached to hinge member 20. Cap screws 14 and 15 are then adjusted until the central axis of stud 4 and closure member 2 are in a horizontal plane through the central axis of the opening in vessel 1. Referring particularly to Figure 1, the central axis of closure member 2 may be raised by screwing cap screw 14 into lug 12. The end of the cap screw will push against bearing surface 10 causing hinged support member 11 to rotate in a counterclockwise direction. When the proper adjustment has been made, cap screw 15 may then be turned down against bearing surface 10 to lock hinge support member 11 in position. Closure member 2 may then be rotated relative to hinge member 20 and fitted through the opening into the enlarged portion 7 of vessel 1. Hinge members 16 and 20 permit horizontal movement of closure member 2 away from or toward mounting 9. Gasket 3 is then fitted in place on closure member 2 and the assembly is withdrawn from until the gasket engages the sealing surface of vessel 1. Spider 5 is then fitted in position and the opening is sealed by pulling up nut 6. Pressure within the vessel will further seal the joint. Should closure member 2 become misaligned because of wear of the hinge pins, of the ends of cap screws 14 and 15 or of bearing surface 10, or for other reasons, it may be simply realigned by adjustment of cap screws 14 and 15 with a wrench. No special tools or equipment are required and the adjustment may be as small or large as desired within the limits of the length of the cap screws. We thus provide a novel and useful hinge which is capable of wide and

critical adjustments which may be quickly and readily made without a large crew of workmen or special equipment.

While we have shown and described a present preferred embodiment of our invention, it is to be understood that we do not so limit ourselves and that our invention may be otherwise practiced within the scope of the following claims.

We claim:

1. Means for supporting a member comprising a mounting attached to a second member adjacent the supported member, a hinge support member pivotally attached to the mounting, screw means to prevent pivotal movement of the hinge support member in one direction, screw means to prevent pivotal movement of the hinge support member in another direction, a plurality of hinge members pivotally joined end to end, one hinge member being attached to the mounting and another hinge member being attached to the supported member.

2. Means for supporting a member comprising a mounting attached to a second member adjacent the supported member, a hinge support member pivotally connected to the mounting, screw means attached to and preventing pivotal movement in one direction of the hinge support member when in juxtaposition with the second member, second screw means attached to and preventing pivotal movement in another direction of the hinge support member when in juxtaposition with the second member, and a plurality of hinge members pivotally connecting the hinge support member and the supported member, the pivotal axes of said hinge members being substantially at right angles to the pivotal axis of said hinge support member.

3. Means for supporting a member of substantial weight comprising a hinge support member pivotally mounted adjacent the supported member, hinge means pivotally connecting the supported member to said hinge support means, said hinge support member being pivotally movable for movement of the supported member in a vertical plane, screw means engaging said hinge support member and engaging other means whereby the hinge support member may be rotated on its vertical axis by adjustment of the screw means for vertical adjustment of said supported member.

4. A hinge for supporting a member of substantial weight comprising a mounting member, a hinge support member connected to the mounting member, a plurality of hinge members pivotally attached end to end with one end of one hinge member being pivotally attached to the hinge support member and one end of another hinge section being pivotally attached to the supported member, said hinge support member being pivotally movable for movement of the supported member in a vertical plane, and screw means engaging said hinge support member and other means whereby the hinge support member may be rotated on its pivotal axis by adjustment of said screw means for vertical adjustment of said supported member.

5. A hinge for supporting a member of substantial weight comprising a mounting member, a hinge support member in attached relationship to said mounting and pivotally movable relative thereto, said pivotal axis being in a horizontal plane, a first hinge member pivotally connected to the hinge support member, a second hinge member pivotally connected to the first hinge member, said second hinge member also being pivotally connected to the supported member, the hinge member pivotal axes being vertically disposed, and screw means maintaining said hinge support means in adjustable relationship to said mounting member, the screw means being adjustable whereby the pivotal relationship of the mounting member and hinge support member and the vertical position of said supported member are changed.

6. A hinge for supporting a member of substantial weight comprising a mounting member, a hinge support member pivotally attached to the mounting member on a pivotal axis, said axis being in a horizontal plane, a plurality of hinge members pivotally attached end to end with one end of one hinge member being pivotally attached to the hinge support member and one end of another hinge member being pivotally attached to the supported member, all the hinge member pivotal axes being vertically disposed, and adjustable screw means in restraining relationship to said hinge support member whereby adjustment of said screw means causes rotation of said hinge support member on its pivotal axis and vertical adjustment of said supported member.

7. A hinge for supporting a member of substantial weight comprising a mounting member, a hinge support member pivotally attached to the mounting, the pivotal axis thereof being substantially in a horizontal plane, a plurality of hinge members pivotally attached end to end with one end of one hinge member being pivotally attached to the hinge support member and one end of another hinge member being pivotally attached to the supported member on an axis substantially perpendicular to other said pivotal axis, and screw means engaging said hinge support member and other means whereby the hinge support member may be rotated on its pivotal axis by adjustment of the screw means for vertical adjustment of said support member.

8. Means for supporting a member of substantial weight comprising a hinge support member pivotally mounted adjacent the supported member, hinge means pivotally connecting the supported member to the hinge support member, said hinge support member being pivotally movable for movement of the supported member in a vertical plane, screw means threadably engaging said hinge support member and engaging other means whereby the hinge support member may be rotated on its pivotal axis by adjustment of the screw means for vertical adjustment of said supported member.

9. A hinge for supporting a member of substantial weight comprising a mounting member, a hinge support member in pivotal connection with the mounting member, the pivotal axis being generally horizontal, a plurality of hinge members pivotally attached end to end with one end of one hinge member being pivotally attached to the hinge support member and one end of another hinge member being pivotally attached to the supported member, said hinge support member being pivotally movable for movement of the supported member in a vertical plane, and screw means engaging said hinge support means and other means whereby the hinge support member may be rotated on its pivotal axis by adjustment of the screw means causing vertical adjustment of said supported member.

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